BACHELOR'S DEGREE FINAL EXAMINATION

Telecommunications Technologies and Systems

- July, September 2026

- February 2027

Assessment of fundamental and specialized knowledge

1. Fundamental Knowledge

Electronic Devices / Fundamental Electronic Circuits

1. Applications related to **DC analysis** of circuits using **FETs, diodes, and BJTs**;
2. Applications related to the **AC small-signal analysis** of circuits using **FETs, diodes, and BJTs**;
3. **Basic amplification stages** using BJTs and FETs;
4. **Multi-stage amplifiers** – fast method;
5. Applications related to **FET switching circuits**;
6. Analysis of **feedback amplifiers** – applications regarding the identification of the feedback circuit, feedback topology and approximate closed-loop gain;
7. **DC voltage regulators** – applications related to treating series regulator circuits as negative feedback amplifiers;

Bibliography

1. C.M. Neacsu, *Electronic Devices* – MOODLE;
2. G. Bonteanu, *Fundamental Electronic Circuits* – MOODLE;

Signals, Circuits, and Systems

1. Parameters of particular periodical signals. Applications for the steady-state response of linear circuits for harmonic input signals; calculation of the transfer function; types of filters (pages 2-19);

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2. Fourier Series applications for filtering of the periodical signals (pages 20-32);
3. Bode Diagrams applications (pages 33-46);
4. Fourier Transform applications (pages 47-55);
5. Transient response applications (pages 56-61);

Bibliography

Moodle file: Final written exam applications for the bachelor degree final exam (June 2026);

Digital Integrated Circuits

1. **Combinational circuit synthesis** at logic gate level;
2. **Basic logic circuits** (multiplexers, demultiplexers, decoders, comparators, adders, subtractors);
3. **CMOS transistor-level topologies** (standard CMOS, pseudo-NMOS, differential cascode) – CLC, Chapter 4;
4. **Latches and flip-flops**;
5. **Counters** (applications);
6. **Registers** (applications);

Bibliography

- Digital Design, Principles and Practices, 4th edition, John F. Wakerly, Pearson – Prentice Hall, 2006/2000/1994 (english);
- Engineering Digital Design, Richard F. Tinder, Academic Press, 2000 (english);
- Digital Design, 4th edition, Morris Mano, Pearson – Prentice Hall, 2006 (english).

2. Specialized Knowledge

Discipline: Computer Networks and Operating Systems

1. Network Models (ISO/OSI, TCP/IP, client-server) ([BRC] pag. 15 – 21);
2. TCP/IP Protocol Suite ([BRC] pag. 22-30);
3. IPv4 Addressing ([BRC] pag. 55-69);
4. Computer Network Architecture ([BRC] pag. 61-65);
5. IEEE 802.3 standard ([BRC] pag. 71-81);
6. IEEE 802.11 standard ([BRC] pag. 88-91);

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7. Cables and connectors. Wireless medium ([BRC] pag. 104-120);
8. Physical Layer equipment ([BRC] pag. 121-125 şi 129-134);
9. Link Layer network equipment ([BRC] pag. 154-168);
10. Network Layer equipment (Router) ([BRC] pag. 168-174);

References:

[BRC] Luminița SCRIPCARIU, "Bazele reţelelor de calculatoare", Ed. CERMI, IAŞI, 2005, disponibil în format pdf, arhivat pe Moodle: https://edu.etti.tuiasi.ro/course/view.php?id=72.

[CNOS] Luminița SCRIPCARIU, "Computer Netqorks and Operating Systems" – lecture presentations, on Moodle: https://edu.etti.tuiasi.ro/course/view.php?id=72.

[TAN] Andrew Tanenbaum, "Computer Networks", Prentice-Hall, 4th Edition, https://theswissbay.ch/pdf/Gentoomen%20Library/Networking/Prentice%20Hall%20-%20Computer%20Networks%20Tanenbaum%204ed.pdf

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Discipline: Mobile Communications (*order numbers are the ones in the Lecture Notes*)

2.1 – Cellular Concept;
2.2 – Cellular Geometry Properties;
2.5 – Traffic Capacity of Cellular Networks;
4.5 – Orthogonal Frequency Division Multiple Access (OFDMA);
4.7 – Code Division Multiple Access (CDMA);
6.4 – Network Security and User Privacy (in GSM Networks);
6.7 – Logical Channels and Physical Channels (in GSM Networks);
7.2 – GPRS Technology;
8.2 – UMTS Networks;
9.3 – Downlink Multiple Access (in LTE);
9.4 – Uplink Multiple Access (in LTE);
9.5 – LTE-Advanced (LTE-A);

References:

Lecture Notes - https://edu.etti.tuiasi.ro/pluginfile.php/42182/mod_resource/content/2/MC_Lecture_Notes_24_25.pdf

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Discipline: Radiocommunications

1. Radio Frequency Power Amplifiers

- Operating regimes of the transistor in RF power amplifiers (RFPA);
- RF amplifier with the device operating in linear regime;
- RF amplifier with the transistor operating in nonlinear regime;
- Class C RF power amplifier;

2. Analog Modulations

- AM signals. Spectra;
- Power (energy) relationships in AM;
- Principles of AM signal demodulation;
- Types of amplitude modulation;
- Frequency and phase modulation;
- Frequency-modulated (FM) signals;
- Phase-modulated (PM) signals;
- Spectrum of FM and PM signals;
- Narrowband angle-modulated signals;
- Wideband angle-modulated signals;
- Comparisons between the spectra of FM and PM signals;
- Demodulation of FM signals;

3. Digital Modulations

- Radiocommunication systems with basic digital modulations (BASK, BPSK, BFSK, DPSK, QPSK);
- Coherent and non-coherent detection;
- Costas loop;
- Modified Costas loop;

4. Principles of Radio Reception

- Characteristics of radio receivers;
- Types of radio receivers;
- Image frequency;

5. Indirect Frequency Synthesis based on PLL

- Linear model of the PLL;

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- Type 1, second-order phase-locked loops;
- Type 2, second-order phase-locked loops;
- Principle of frequency synthesis using PLL;

6. Mixers

- Principle of frequency conversion;
- Single-ended mixer;
- Balanced mixer;
- Double-balanced mixer with Gilbert cell;
- Diode mixers.

References

[1] Radu Gabriel Bozomitu, *Radiocommunications* (Course), Moodle platform https://edu.etti.tuiasi.ro/course/view.php?id=120;

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